

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date
24 June 2004 (24.06.2004)

PCT

(10) International Publication Number
WO 2004/053396 A1

(51) International Patent Classification⁷:

F24C 3/08

(21) International Application Number:

PCT/KR2003/002697

(22) International Filing Date: 9 December 2003 (09.12.2003)

(25) Filing Language:

Korean

(26) Publication Language:

English

(30) Priority Data:

10-2002-0079237

12 December 2002 (12.12.2002) KR

(71) Applicant (for all designated States except US): LG ELECTRONICS INC. [KR/KR]; 20, Yoido-dong, Youngdungpo-gu, 150-721 Seoul (KR).

(72) Inventors; and

(75) Inventors/Applicants (for US only): LEE, Dae Rae [KR/KR]; 7-208, Daewoo Apt., 63, Sangnam-dong, Changwon-si, 641-830 Gyeongsangnam-do (KR). JUNG, Dae Hee [KR/KR]; 104-1709, Sungwontowol Apt., Sangnam-dong, Changwon-si, 641-010 Gyeongsangnam-do (KR).

(74) Agents: BAHNG, Hae Cheol et al.; KIMS INTERNATIONAL PATENT & LAW OFFICE, 15th Floor Yo Sam Building, 648-23, Yeoksam-dong, Kangnam-gu, 135-080 Seoul (KR).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

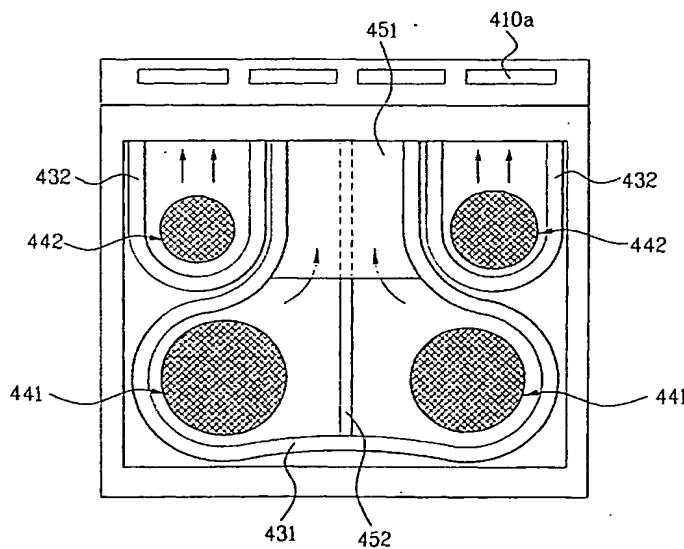
(84) Designated States (regional): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

[Continued on next page]

(54) Title: APPARATUS FOR VENTILATION IN A RADIATION GAS RANGE



(57) Abstract: Exhaust system in a radiation gas range including a housing having exhaust openings (410a) in a rear part for discharge of exhaust gas, a sheet of glass on top of the housing for transmission of radiant heat to a heating object placed thereon, front and rear burner housings (431,432) in contact with a bottom surface of the sheet of glass for forming spaces to burn mixed gas therein, front radiation gas burners (441) in lower parts of the front burner housings (431) respectively each for burning mixed gas at a surface of a radiation body to generate a radiation energy, rear radiation gas burners (442) in lower parts of the front burner housings (431) respectively each for burning mixed gas at a surface of a radiation body to generate a radiation energy, and an exhaust duct (451) in lower parts of, and in communication with the front and/or rear burner housings (431,432) for discharging exhaust gas from the front and rear radiation burners (441,442) toward the exhaust openings (410a).

WO 2004/053396 A1

WO 2004/053396 A1



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

-1-

APPARATUS FOR VENTILATION IN A RADIATION GAS RANGE

Technical Field

5 The present invention relates to a radiation gas ranges, and more particularly, to an exhaust system in a radiation gas range, for discharging exhaust gas from radiation burners to an outside of the radiation gas range.

Background Art

In general, a gas range has a plurality of gas burners having fuel gas and air supplied thereto at the same time, to burn a mixed gas of the fuel gas and the air, for 10 cooking food.

Recently, use of a gas oven range is increasing, which has a composite function of a gas range function for heating food placed on a gas burner, an oven function for heating, and cooking food put inside of an enclosed cooking space, and a grill function 15 for grilling fish by means of heat convection.

FIG. 1 illustrates a perspective view of a related art gas oven range schematically, provided with an oven part 1 for making barbecue or baking bread by using vertical heat and heat convection, a grill part 2 over the oven part 1 for grilling fish brown by using heat convection, a top burner part 3 over the grill part 2 for heating 20 food or a container having the food placed therein, and a back guard part 4 for discharging exhaust gas from the oven part 1, the grill part 2, and the top burner part 3.

There are a plurality of gas burners 3a exposed to an outside of the range on the top burner part 3 for burning a mixed gas of the fuel gas supplied from an outside of the range and air, to heat food.

25 In the meantime, the related art gas oven range has problems in that the flame from the burner 3a of the top burner part 3, exposed to the outside of the range, always

-2-

has fire hazard, soup of food, overflowed from cooking container, is liable to extinguish fire, imperfect combustion may be caused by flame holes blocked with the overflowed soup and foreign matters, it is difficult to clean as disassemble relevant parts of the gas burner is required for removal of foreign matters.

5 To solve the foregoing problems in the related art, radiation gas burners have been developed, in which a ceramic glass is provided on top of the top burner part of the gas oven range, or on top of the gas range, and a plurality of radiation gas burners are provided under the ceramic glass concealed from an outside of the range, for heating food with radiation heat through the ceramic glass without direct touch of the flame
10 from the radiation gas burners to the food.

However, the related art radiation gas range has a problem in that a high temperature exhaust gas staying in the range due to the concealed structure of the radiation gas burners that impedes natural discharge of the exhaust gas acts as a thermal load, that impedes smooth supply of external air to an inside of the radiation gas burners,
15 and results in failure in proper combustion.

Disclosure of Invention

An object of the present invention, designed for solving the foregoing problems, is to provide an exhaust system in a radiation gas range, for smooth discharge of exhaust gas produced from a plurality of radiation gas burners in burning the gas.

20 To achieve the object of the present invention, there is provided an exhaust system in a radiation gas range including a housing having exhaust openings in a rear part for discharge of exhaust gas, a sheet of glass on top of the housing for transmission of radiant heat to a heating object placed thereon, front and rear burner housings in contact with a bottom surface of the sheet of glass for forming spaces to burn mixed gas
25 therein, front radiation gas burners in lower parts of the front burner housings

respectively each for burning mixed gas at a surface of a radiation body to generate a radiation energy, rear radiation gas burners in lower parts of the front burner housings 32 respectively each for burning mixed gas at a surface of a radiation body to generate a radiation energy, and an exhaust duct in lower parts of, and in communication with the 5 front and/or rear burner housings for discharging exhaust gas from the front and rear radiation burners toward the exhaust openings.

Thus, the present invention can guide the exhaust gas from the front radiation gas burners and the rear radiation gas burners to the exhaust openings through the exhaust duct smoothly, and discharges therefrom.

10 In other aspect of the present invention, there is provided an exhaust system in a radiation gas range including a housing having exhaust openings in a rear part for discharge of exhaust gas, a sheet of glass on top of the housing for transmission of radiant heat to a heating object placed thereon, two front burner housings, and two rear burner housings in contact with a bottom surface of the sheet of glass for forming 15 spaces to burn mixed gas therein, two front radiation gas burners, and two rear radiation gas burners in lower parts of the front, and rear burner housings respectively each for burning mixed gas at a surface of a radiation body to generate a radiation energy, a first exhaust duct in lower parts of, and to pass through spaces between the front burner housings, and between the rear burner housings in communication with the front burner 20 housings, for discharging exhaust gas from the front radiation burners toward the exhaust openings, and a second exhaust duct, inside of, and separate from the first exhaust duct in communication with the rear burner housings.

Thus, as the exhaust gas from the front, and rear radiation gas burners can be discharged separately, the present invention can discharge the exhaust gas smoother 25 than a case the exhaust gas is discharged together, minimizes an influence of one side

-4-

exhaust gas to the other side exhaust gas to make smooth air introduction into the radiation gas burners.

In another aspect of the present invention, there is provided an exhaust system in a radiation gas range including a housing having exhaust openings in a rear part for discharge of exhaust gas, a sheet of glass on top of the housing for transmission of radiant heat to a heating object placed thereon, two front, and rear burner housings in contact with a bottom surface of the sheet of glass for forming spaces to burn mixed gas therein, two front radiation gas burners, and two rear radiation gas burners in lower parts of the front, and rear burner housings respectively each for burning mixed gas at a surface of a radiation body to generate a radiation energy, a central exhaust duct between lower parts of, and in communication with the front burner housings, for guiding exhaust gas from the front radiation gas burners to the exhaust openings, a partition wall at a central part of the central exhaust duct for dividing the central exhaust duct into two parts, one of which is in communication with the front burner housing on a left side, and the other one of which is in communication with the front burner housing on a right side, and two rear exhaust ducts in communication with rear parts of the rear burner housings individually, for discharging exhaust gas from the front radiation gas burners and the rear radiation gas burners toward the exhaust openings.

Thus, the exhaust system in a radiation gas range of this embodiment permits to maximize an exhaust gas discharge performance since exhaust gas from the radiation gas burners is discharged independently.

In further aspect of the present invention, there is provided an exhaust system in a radiation gas range including a housing having exhaust openings in a rear part for discharge of exhaust gas, a sheet of glass on top of the housing for transmission of radiant heat to a heating object placed thereon, front and rear burner housings in contact

-5-

with a bottom surface of the sheet of glass for forming spaces to burn mixed gas therein, front radiation gas burners in lower parts of the front burner housings respectively each for burning mixed gas at a surface of a radiation body to generate a radiation energy, rear radiation gas burners in lower parts of the front burner housings 5 32 respectively each for burning mixed gas at a surface of a radiation body to generate a radiation energy, and an exhaust duct formed to adjoin to a bottom of the sheet of glass, in communication with one side part of each of the front and/or rear burner housings for discharging exhaust gas from the front, and rear radiation burners toward the exhaust openings.

10 Thus, the present invention permits smoother discharge of the exhaust gas from the burner housings to the exhaust duct since the exhaust duct is in communication with one side part of each of the front, and rear burner housings, directly.

In another embodiment of the present invention, the exhaust duct includes a central exhaust duct formed at a central part of the housing to adjoin to a bottom of the 15 sheet of glass, and to pass between the front burner housings, and between the rear burner housings, and in communication with one side part of each of the front burner housings, for guiding exhaust gas from the front radiation gas burners to the exhaust openings, and two rear exhaust ducts on both sides of a rear part of the central duct in communication with rear parts of the rear burner housings individually, for discharging 20 exhaust gas from the rear radiation gas burners toward the exhaust openings.

Thus, the present invention can improve the exhaust performance further since the exhaust gas from the front burner housing, and the exhaust gas from the rear burner housing are discharged, separately.

Brief Description of Drawings

25 The accompanying drawings, which are included to provide a further

-6-

understanding of the invention, illustrate embodiments of the invention and together with the description serve to explain the principle of the invention. In the drawings;

FIG. 1 illustrates a perspective view of a related art gas oven range;

5 FIG. 2 illustrates a disassembled perspective view of a radiation gas range in accordance with a preferred embodiment of the present invention, schematically;

FIG. 3 illustrates a plan view of the exhaust system in the radiation gas range in FIG. 2, schematically;

FIG. 4 illustrates a section of the exhaust system in the radiation gas range in FIG. 2, schematically;

10 FIG. 5 illustrates a plan view of an exhaust system in a radiation gas range in accordance with a second preferred embodiment of the present invention, schematically;

FIG. 6 illustrates a perspective view of an exhaust system in a radiation gas range in accordance with a third preferred embodiment of the present invention, schematically;

15 FIG. 7 illustrates a section of key parts of the exhaust system of the radiation gas range in FIG. 6;

FIG. 8 illustrates a plan view of an exhaust system in a radiation gas range in accordance with a fourth preferred embodiment of the present invention, schematically;

20 FIG. 9 illustrates a plan view of an exhaust system in a radiation gas range in accordance with a fifth preferred embodiment of the present invention, schematically;

FIG. 10 illustrates a perspective disassembled view of an exhaust system in a radiation gas range in accordance with a sixth preferred embodiment of the present invention, schematically;

FIG. 11 illustrates a plan view of the radiation gas range in FIG. 10;

25 FIG. 12 illustrates a plan view of an exhaust system in a radiation gas range in

-7-

accordance with a seventh preferred embodiment of the present invention, schematically; and

FIG. 13 illustrates a plan view of an exhaust system in a radiation gas range in accordance with an eighth preferred embodiment of the present invention, schematically.

5 Best Mode for Carrying Out the Invention

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. For better understanding, partition walls that separate front and/or rear burner housings in left/right sides in FIGS. 3 to 13 are not shown in the following embodiments.

10 FIGS. 2 and 4 illustrate one embodiment of a radiation gas range of the present invention, including a housing 10 having exhaust openings 10a in a rear part for discharge of exhaust gas, a ceramic glass 20 on top of the housing to enclose the top for placing a heating object thereon, front and rear burner housings 31, and 32 in contact with a bottom surface of the ceramic glass 20, front radiation gas burners 41 arranged in lower parts of the front burner housings respectively 31 each for burning mixed gas at a surface of a radiation body to generate a radiation energy, rear radiation gas burners 42 arranged in lower parts of the front burner housings 32 each for burning mixed gas at a surface of a radiation body to generate a radiation energy, and an exhaust duct 50 in lower parts of the front and rear burner housings 31 and 32 along a central part of the 15 housing 10 to form an exhaust passage 'F' for discharging exhaust gas from the front and rear burners 41, and 42 toward the exhaust openings 10a in the rear part of the housing 10.

20 There are two sets of each of the front, and rear burner housings 31, and 32, and two sets of each of the front, and rear radiation gas burners provided in left/right sides in 25 the range.

There are two sets of each of the front, and rear burner housings 31, and 32, and

two sets of each of the front, and rear radiation gas burners provided in left/right sides in

25 the range.

There are front inlets 31a in bottoms of the front burner housings 31 for introduction of the exhaust gas into the exhaust duct 50 from the front radiation gas burners 41, and rear inlets 32a in bottoms of the rear burner housings 32 for introduction of the exhaust gas into the exhaust duct 50 from the rear radiation gas burners 42.

There are partition walls 34 between the front burner housings 31, and between the rear burner housings 32 for separating the front burner housings 31, and the rear burner housings 32 from each other.

The operation of the radiation gas range of the present invention will be described.

When a user places a cooking container on the ceramic glass 20, and operates a flame control knob 11, flame is produced from surfaces of the front, and rear radiation gas burners 41, and 42 to take place a surface combustion as a mixed gas of fuel gas and air is supplied to the front and rear radiation gas burner 41, and 42, such that radiant heat is transmitted to the cooking container through the ceramic glass 20, to heat the cooking container.

The exhaust gas produced in the front and rear burner housings 31 and 32 by combustion at the front, and rear radiation gas burners 41, and 42 are introduced into the exhaust duct 50 through the front, and rear inlets 31a, and 32a, and flows to the exhaust openings 10a in the rear part of the housing 10, and discharged to an outside of the range.

In the meantime, in a first preferred embodiment of the exhaust system in a radiation gas range, even though it is designed that all exhaust from the radiation gas burners 41, and 42 is discharged through one exhaust duct 50, alike the exhaust system in a radiation gas range in accordance with a second preferred embodiment of the

present invention as shown in FIG. 5, a partition wall 51 may be provided at a center of the exhaust duct 50 that divides the exhaust duct 50 into left, and right side parts, with the left side part in communication with the front, and rear burner housings 31, and 32 on the left side, and the right side part in communication with the front, and rear 5 burner housings 31, and 32 on the right side.

In this case, the exhaust gas from the left side front, and rear radiation gas burners 41, and 42 is introduced into the left side of the exhaust duct 50 through the left side front, and rear inlets 31a, and 32a, and therefrom discharged through the exhaust openings 10a, and the exhaust gas from the right side front, and rear radiation gas 10 burners 41, and 42 is introduced into the right side of the exhaust duct 50 through the right side front, and rear inlets 31a, and 32a, and therefrom discharged through the exhaust openings 10a.

Therefore, the exhaust system of this embodiment can enhance an exhaust performance in a case many radiation gas burners are used at the same time because the 15 exhaust gas is discharged separated in left and right sides.

FIGS. 6 or 7 illustrate an exhaust system in a radiation gas range in accordance with a third preferred embodiment of the present invention, including, alike the exhaust system in a radiation gas range in accordance with a first preferred embodiment of the present invention, a housing 210 having exhaust openings 10a in a rear part for 20 discharge of exhaust gas, a ceramic glass 220 on top of the housing to enclose the top for placing a heating object thereon, two front and rear burner housings 231, and 232 in contact with a bottom surface of the ceramic glass 220, two sets of front radiation gas burners 241 arranged in a lower part of the front burner housing 231 each for burning mixed gas at a surface of a radiation body to generate a radiation energy, and two sets of 25 rear radiation gas burners 242 arranged in the lower part of the front burner housing 232

-10-

each for burning mixed gas at a surface of a radiation body to generate a radiation energy,

Also, there is a first exhaust duct 251 in lower parts of the front and rear burner housings 231 and 232 along a central part of the housing 210, and a second exhaust duct 5 252 inside of, and separate from the first exhaust duct 251, having one end in communication with the exhaust openings 210a.

It is preferable that a sectional area of the second exhaust duct 252 is smaller than 1/2 of a sectional area of the first exhaust duct 251, for smooth discharge of the exhaust gas from the first exhaust duct 251 toward the exhaust openings 210a.

10 There are front inlets 231a in one side parts of the front burner housings 231 for introduction of the exhaust gas from the front radiation gas burners 241 into the first exhaust duct 251, and rear inlets 232a in one side parts of the rear burner housings 232 for introduction of the exhaust gas from the front radiation gas burners 242 into the second exhaust duct 252.

15 According to this, the exhaust gas produced in the front burner housings 231 by combustion at the front radiation gas burners 241 is introduced into the first exhaust duct 251 through the front inlets 231a, and therefrom discharged through the exhaust openings 210a, and the exhaust gas produced in the rear burner housings 232 by combustion at the rear radiation gas burners 242 is introduced into the second exhaust 20 duct 252 through the rear inlets 232a, and therefrom discharged through the exhaust openings 210a.

In the meantime, even though the exhaust gas from the front, and rear radiation gas burners 241, and 242 is discharged separately in this embodiment, different from this, alike the exhaust system in a radiation gas burner in accordance with a fourth 25 preferred embodiment of the present invention as shown in FIG. 8, by forming a first

-11-

partition wall 253 at a center part of the first exhaust duct 251 for dividing the first exhaust duct 251 into left and right side part, and a second partition wall 254 at a center part of the second exhaust duct 252 for dividing the second exhaust duct 252 into left and right side part, the exhaust gas from the four front, and rear radiation gas 5 burners 241, and 242 can be discharged independently.

Of course, the first, and second partition walls 253, and 254 can be formed selectively as required.

FIG. 9 illustrates an exhaust system in a radiation gas range in accordance with a fifth preferred embodiment of the present invention, including each two front burner 10 housings 331 and front radiation gas burners 341 in a front part of a housing 310, and each two rear burner housings 332 and rear radiation gas burners 342 in a rear part of the housing 310.

There is a central exhaust duct 351 along a central part of the housing 10 under the front burner housing 31. There is a partition wall 352 at a central part of the central 15 exhaust duct 351 for dividing the central exhaust duct 351 into left, and right side parts, and there is a front inlet 331a in one side part of each of the front burner housings 331, in communication with the left, and right side parts of the divided central exhaust duct 351.

Each of the rear housings 332 is in communication with the exhaust opening 20 310a through a rear exhaust duct 353. Like the central exhaust duct 351, though the rear exhaust duct 353 may be formed under the rear burner housing 32, it is preferable that the rear exhaust duct 353 is formed under, and to adjoin to the ceramic glass such that the rear exhaust duct 353 is connected to a rear part of the rear burner housing 32.

Accordingly, the exhaust system of the embodiment permits that the exhaust 25 gas from the front radiation gas burners 341 is introduced into the left and right parts of

-12-

the central exhaust duct 351 through the front inlets 331a respectively, and discharged to the exhaust openings 310a separately, and the exhaust gas from the rear radiation gas burners 342 is discharged through the rear exhaust ducts 353, independently.

That is, the exhaust gas from the radiation gas burners 341, and 342 is
5 discharged through the central duct 351, and the rear exhaust ducts 353, independently.

In the meantime, FIGS. 10 or 11 illustrates other embodiment of the radiation gas range of the present invention, including exhaust openings 410a in a rear part of the housing 410 for discharging exhaust gas to an outside of the range, a ceramic glass 420 on top of the housing 410 for transmission of radiant heat to a cooking container placed
10 thereon, and a plurality of front, and rear burner housings 431, and 432 under, and enclosed with the ceramic glass 420 in contact with the ceramic glass 420.

There are two front radiation gas burners 441 under the front burner housings 431 each for burning mixed gas at a surface of a radiation body to generate a radiation energy, and two rear radiation gas burners 442 under the rear burner housings 432 each
15 for burning mixed gas at a surface of a radiation body to generate a radiation energy.

There is a central exhaust duct 451 under, and to adjoin to the ceramic glass 420 in communication with one side part of each of the front burner housings 431. There is a partition wall 452 at central parts of the central exhaust duct 451 and the front burner housings 431 for dividing the central exhaust duct 451 in left and right side parts.

20 There is a rear exhaust duct 455 in a rear part of each of the rear burner housings 32 in communication with rear exhaust openings 410a, individually.

According to the exhaust system in a radiation gas range of the foregoing embodiment, the exhaust gas from the left and right side front burner housings 431 is separated in left, and right sides along the central exhaust duct 451 directly, and
25 discharged to an outside of the range through the exhaust openings 410a, and the

exhaust gas from the rear burner housing 532 flows to the exhaust openings 410a through the rear exhaust ducts 455, and therefrom discharged to an outside of the range.

In the meantime, as shown in FIG. 12, though the exhaust system of the 5 radiation gas range discharges exhaust from the burner housings 410 independently, different from this, one exhaust duct 551 may be formed under the ceramic glass (see FIG. 10) so as to be in communication with one side of each of the front and rear burner housings 531, and 532 at the same time.

Moreover, referring to FIG. 13, one exhaust duct 551 may be formed under the 10 ceramic glass (see FIG. 10) so as to be in communication with one side of each of the front and rear burner housings 531, and 532 at the same time, and a partition wall 552 is arranged at a central part of the exhaust duct 551 to divide the exhaust duct 551 into left, and right side parts, such that the front burner housing 531 and the rear burner housing 532 on the left are in communication with the left side part of the exhaust duct 551, and 15 the front burner housing 531 and the rear burner housing 532 on the right are in communication with the right side part of the exhaust duct 551.

Therefore, in this case, the exhaust gas from the front burner housing 531 and the rear burner housing 532 on the left flows toward the exhaust openings 510a through the left side part of the exhaust duct 551, and therefrom discharged to an outside of the 20 range, and the exhaust gas from the front burner housing 531 and the rear burner housing 532 on the right flows toward the exhaust openings 510a through the right side part of the exhaust duct 551, and therefrom discharged to an outside of the range.

Thus, the exhaust system in a radiation gas range of the present invention permits fast drop of a thermal load on each of the radiation gas burners, and smooth 25 introduction of external air, to improve a combustion efficiency, because the exhaust gas

-14-

from the plurality of radiation gas burners can be discharged smoothly through the exhaust ducts.

Particularly, when the burner housings of the radiation gas burners are in communication with the exhaust ducts independently, to eliminate a possibility that the 5 exhaust gas from one radiation gas burner is not affected by the exhaust gas from another radiation gas burner, smoother discharge of the exhaust can be achieved.

Industrial Applicability

As has been described, the exhaust system in a radiation gas range of the present invention can be applied to any ranges that cook by using gas burning, favorably.

What is Claimed is:

1. An exhaust system in a radiation gas range comprising:
 - a housing having exhaust openings in a rear part for discharge of exhaust gas;
 - a sheet of glass on top of the housing for transmission of radiant heat to a heating object placed thereon;
 - front and rear burner housings in contact with a bottom surface of the sheet of glass for forming spaces to burn mixed gas therein;
 - front radiation gas burners in lower parts of the front burner housings respectively each for burning mixed gas at a surface of a radiation body to generate a radiation energy;
 - rear radiation gas burners in lower parts of the front burner housings respectively each for burning mixed gas at a surface of a radiation body to generate a radiation energy; and
 - an exhaust duct in lower parts of, and in communication with the front and/or rear burner housings for discharging exhaust gas from the front and rear radiation burners toward the exhaust openings.
2. The exhaust system as claimed in claim 1, wherein two sets of each of the front, and rear burner housings, and the front, and rear radiation gas burners are provided, and the exhaust duct is arranged at a central part of the housing to pass between the front radiation gas burners and between the rear radiation gas burners.
3. The exhaust system as claimed in claim 2, further comprising a partition wall at a central part of the exhaust duct, to divide the exhaust duct into two parts, one of which is in communication with the front burner housing and the rear burner housing on

-16-

a left side, and the other one of which is in communication with the front burner housing and the rear burner housing on a right side.

4. The exhaust system as claimed in claim 2, wherein the exhaust duct includes
5 two separate exhaust ducts of a left exhaust duct in communication with the front burner housing and the rear burner housing on a left side, and a right exhaust duct in communication with the front burner housing and the rear burner housing on a right side.

5. The exhaust system as claimed in claim 1, wherein the exhaust duct includes;
10 a first exhaust duct in communication with the front burner housings, and
a second exhaust duct inside of, and separate from the first exhaust duct in communication with the rear burner housings.

6. The exhaust system as claimed in claim 5, wherein the second exhaust duct
15 has a sectional area smaller than 1/2 of a sectional area of the first exhaust duct.

7. The exhaust system as claimed in claim 1, wherein the exhaust duct includes;
a first exhaust duct in communication with the front burner housings, and
second exhaust ducts separate from the first exhaust duct in communication
20 with the rear burner housings, individually.

8. An exhaust system in a radiation gas range comprising:
a housing having exhaust openings in a rear part for discharge of exhaust gas;
a sheet of glass on top of the housing for transmission of radiant heat to a
25 heating object placed thereon;

-17-

two front burner housings, and two rear burner housings in contact with a bottom surface of the sheet of glass for forming spaces to burn mixed gas therein;

two front radiation gas burners, and two rear radiation gas burners in lower parts of the front, and rear burner housings respectively each for burning mixed gas at a 5 surface of a radiation body to generate a radiation energy;

a first exhaust duct in lower parts of, and to pass through spaces between the front burner housings, and between the rear burner housings in communication with the front burner housings, for discharging exhaust gas from the front radiation burners toward the exhaust openings; and

10 a second exhaust duct, inside of, and separate from the first exhaust duct in communication with the rear burner housings.

9. The exhaust system as claimed in claim 8, further comprising a partition wall at a central part of the first exhaust duct, to divide the first exhaust duct into two parts, 15 one of which is in communication with the front burner housing on a left side, and the other one of which is in communication with the front burner housing on a right side.

10. The exhaust system as claimed in claim 8 or 9, further comprising a partition wall at a central part of the second exhaust duct, to divide the second exhaust 20 duct into two parts, one of which is in communication with the rear burner housing on a left side, and the other one of which is in communication with the rear burner housing on a right side.

11. The exhaust system as claimed in claim 8, wherein the second exhaust duct 25 has a sectional area smaller than 1/2 of a sectional area of the first exhaust duct.

12. An exhaust system in a radiation gas range comprising:

a housing having exhaust openings in a rear part for discharge of exhaust gas;

a sheet of glass on top of the housing for transmission of radiant heat to a

5 heating object placed thereon;

two front, and rear burner housings in contact with a bottom surface of the sheet of glass for forming spaces to burn mixed gas therein;

two front radiation gas burners, and two rear radiation gas burners in lower parts of the front, and rear burner housings respectively each for burning mixed gas at a

10 surface of a radiation body to generate a radiation energy;

a central exhaust duct between lower parts of, and in communication with the front burner housings, for guiding exhaust gas from the front radiation gas burners to the exhaust openings;

a partition wall at a central part of the central exhaust duct for dividing the

15 central exhaust duct into two parts, one of which is in communication with the front burner housing on a left side, and the other one of which is in communication with the front burner housing on a right side; and

two rear exhaust ducts in communication with rear parts of the rear burner housings individually, for discharging exhaust gas from the front radiation gas burners

20 and the rear radiation gas burners toward the exhaust openings.

13. An exhaust system in a radiation gas range comprising:

a housing having exhaust openings in a rear part for discharge of exhaust gas;

a sheet of glass on top of the housing for transmission of radiant heat to a

25 heating object placed thereon;

-19-

front and rear burner housings in contact with a bottom surface of the sheet of glass for forming spaces to burn mixed gas therein;

front radiation gas burners in lower parts of the front burner housings respectively each for burning mixed gas at a surface of a radiation body to generate a 5 radiation energy;

rear radiation gas burners in lower parts of the front burner housings 32 respectively each for burning mixed gas at a surface of a radiation body to generate a radiation energy; and

an exhaust duct formed to adjoin to a bottom of the sheet of glass, in 10 communication with one side part of each of the front and/or rear burner housings for discharging exhaust gas from the front, and rear radiation burners toward the exhaust openings.

14. The exhaust system as claimed in claim 13, wherein two sets of each of the 15 front, and rear burner housings, and the front, and rear radiation gas burners are provided, and the exhaust duct is arranged at a central part of the housing to pass between the front radiation gas burners and between the rear radiation gas burners.

15. The exhaust system as claimed in claim 14, further comprising a partition 20 wall at a central part of the exhaust duct, to divide the exhaust duct into two parts, one of which is in communication with the front burner housing and the rear burner housing on a left side, and the other one of which is in communication with the front burner housing and the rear burner housing on a right side.

25 16. The exhaust system as claimed in claim 14, wherein the exhaust duct

-20-

includes two separate exhaust ducts of a left exhaust duct in communication with the front burner housing and the rear burner housing on a left side, and a right exhaust duct in communication with the front burner housing and the rear burner housing on a right side.

5

17. The exhaust system as claimed in claim 13, wherein the exhaust duct includes;

a first exhaust duct in communication with the front burner housings, and
a second exhaust duct inside of, and separate from the first exhaust duct in
10 communication with the rear burner housings.

18. An exhaust system in a radiation gas range comprising:
a housing having exhaust openings in a rear part for discharge of exhaust gas;
a sheet of glass on top of the housing for transmission of radiant heat to a
15 heating object placed thereon;
two front, and rear burner housings in contact with a bottom surface of the sheet
of glass for forming spaces to burn mixed gas therein;
two front radiation gas burners in lower parts of the front burner housings
respectively each for burning mixed gas at a surface of a radiation body to generate a
20 radiation energy;

two rear radiation gas burners in lower parts of the rear burner housings
respectively each for burning mixed gas at a surface of a radiation body to generate a
radiation energy;

25 a central exhaust duct formed at a central part of the housing to adjoin to a
bottom of the sheet of glass, and to pass between the front burner housings, and between

-21-

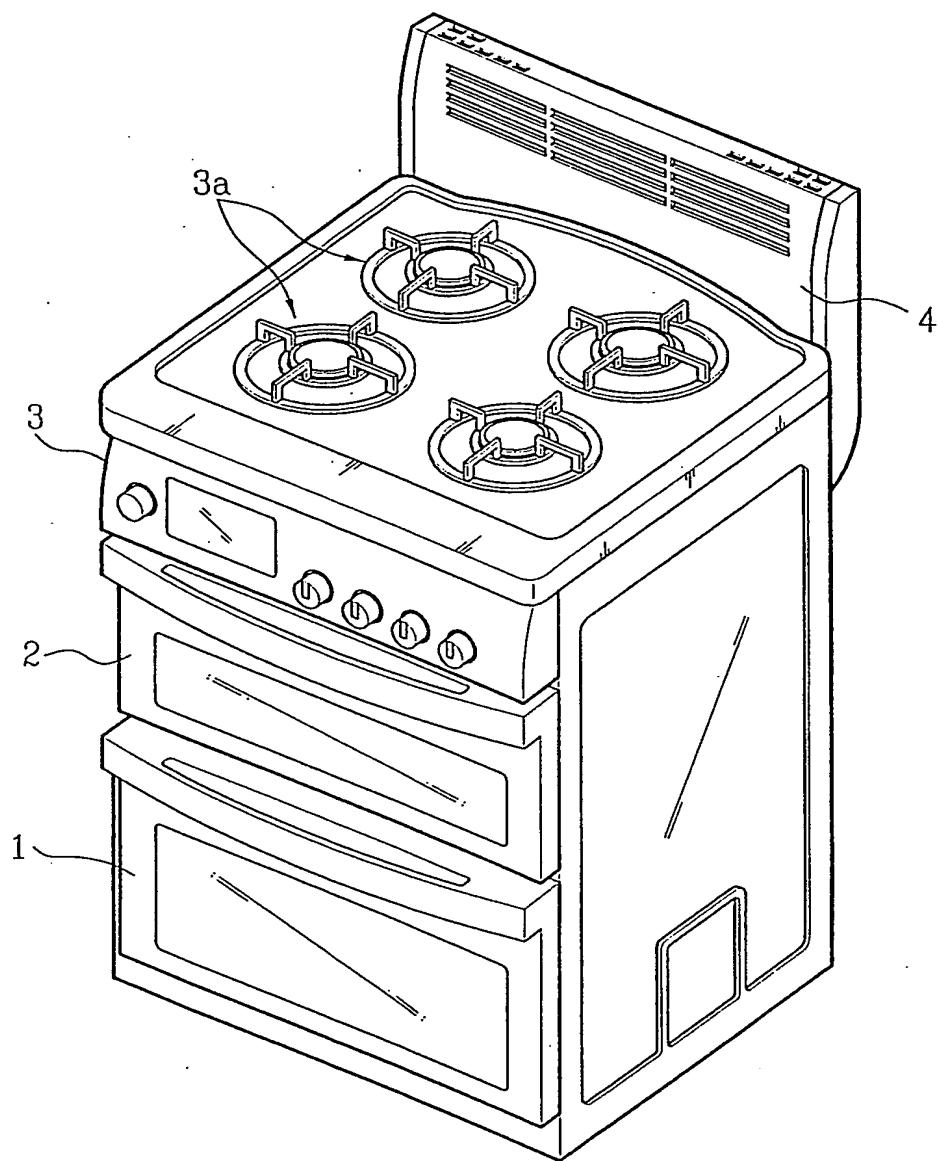
the rear burner housings, and in communication with one side part of each of the front burner housings, for guiding exhaust gas from the front radiation gas burners to the exhaust openings; and

two rear exhaust ducts on both sides of a rear part of the central duct in
5 communication with rear parts of the rear burner housings individually, for discharging exhaust gas from the rear radiation gas burners toward the exhaust openings.

19. The exhaust system as claimed in claim 18, further comprising a partition wall at a central part of the central exhaust duct to divide the central exhaust duct into
10 two parts of which one part is in communication with the front burner housing on a left side, and the other part is in communication with the front burner housing on a right side.

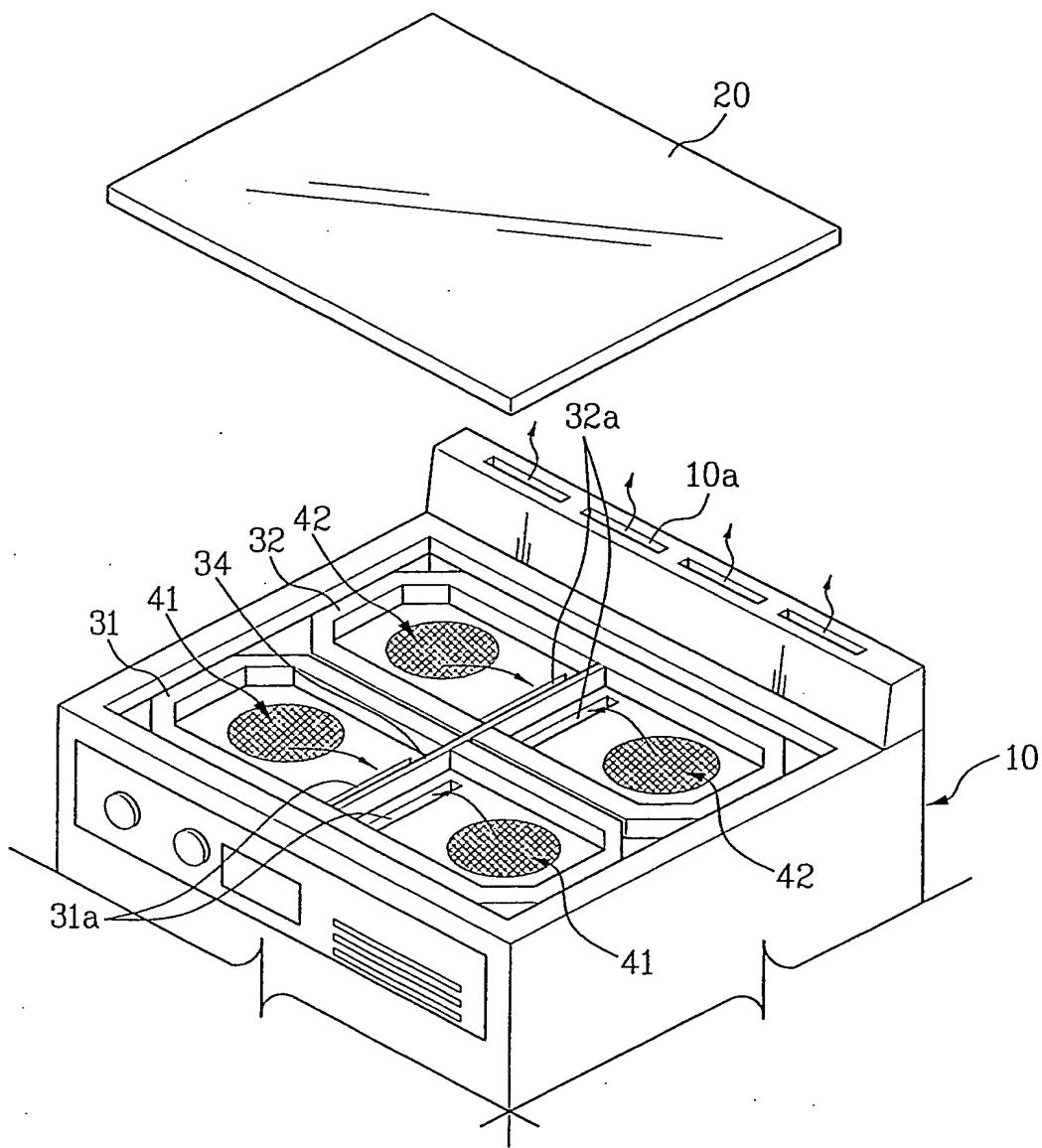
1/13

FIG. 1



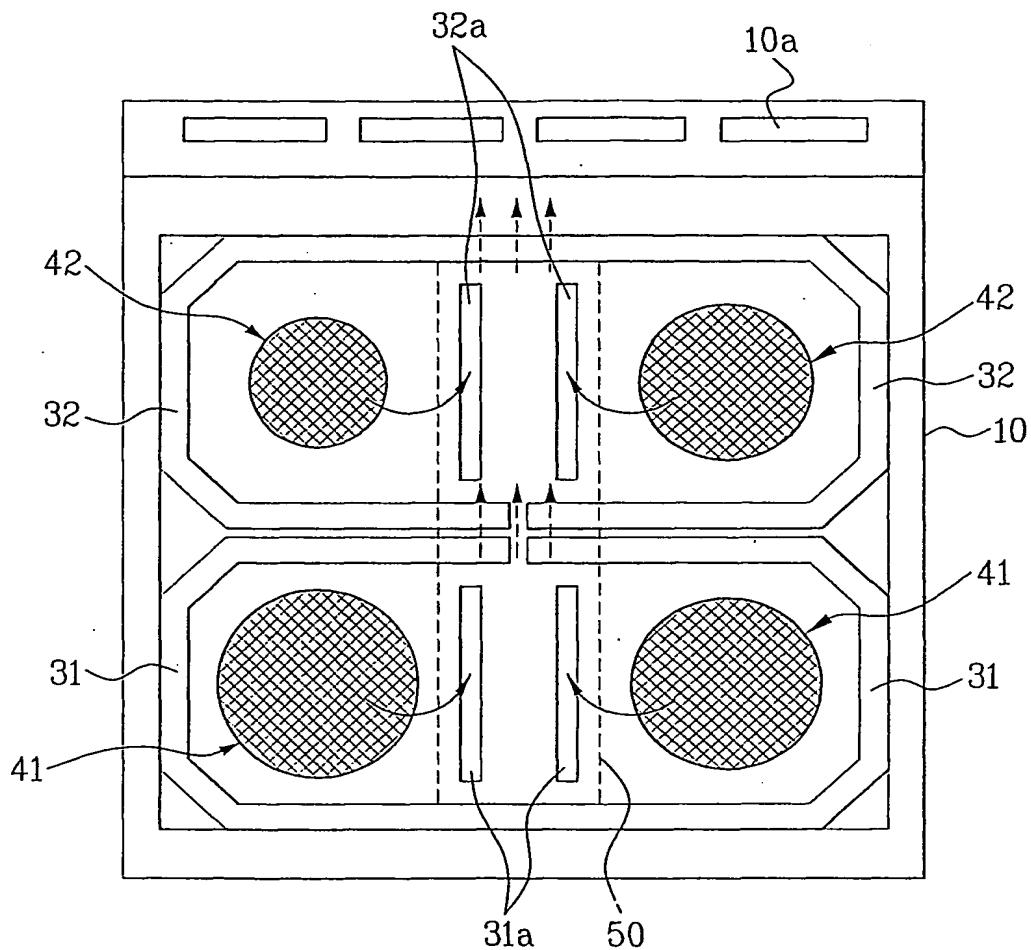
2/13

FIG. 2



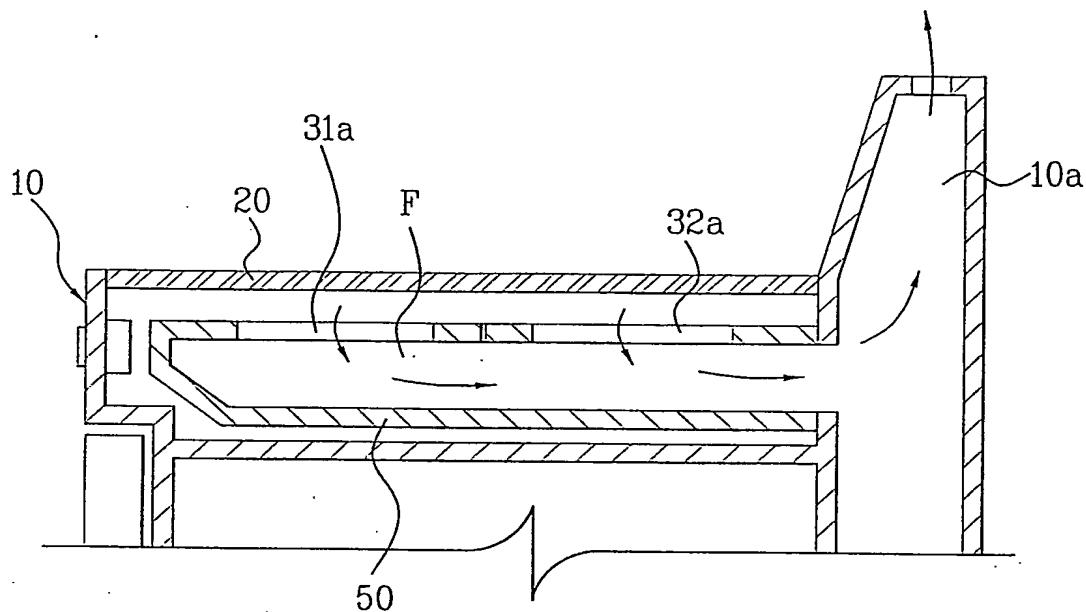
3/13

FIG. 3



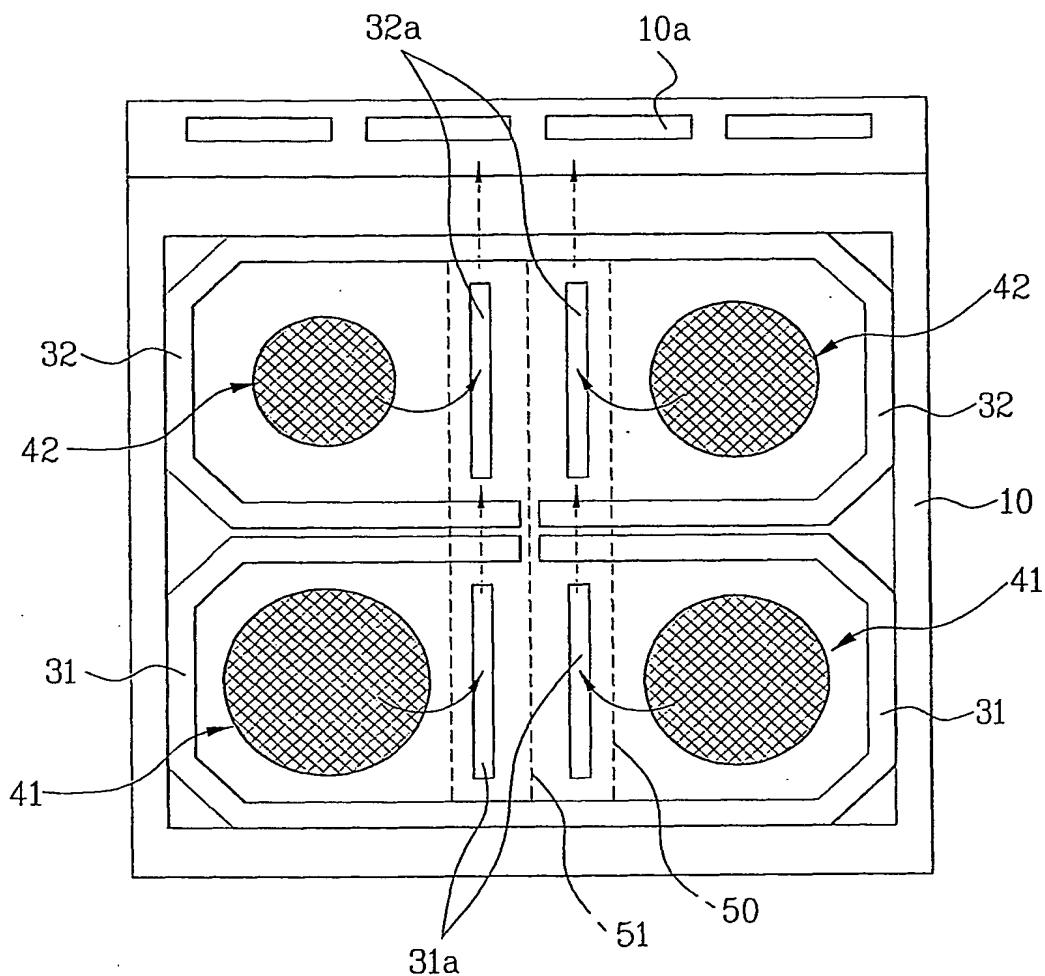
4/13

FIG. 4



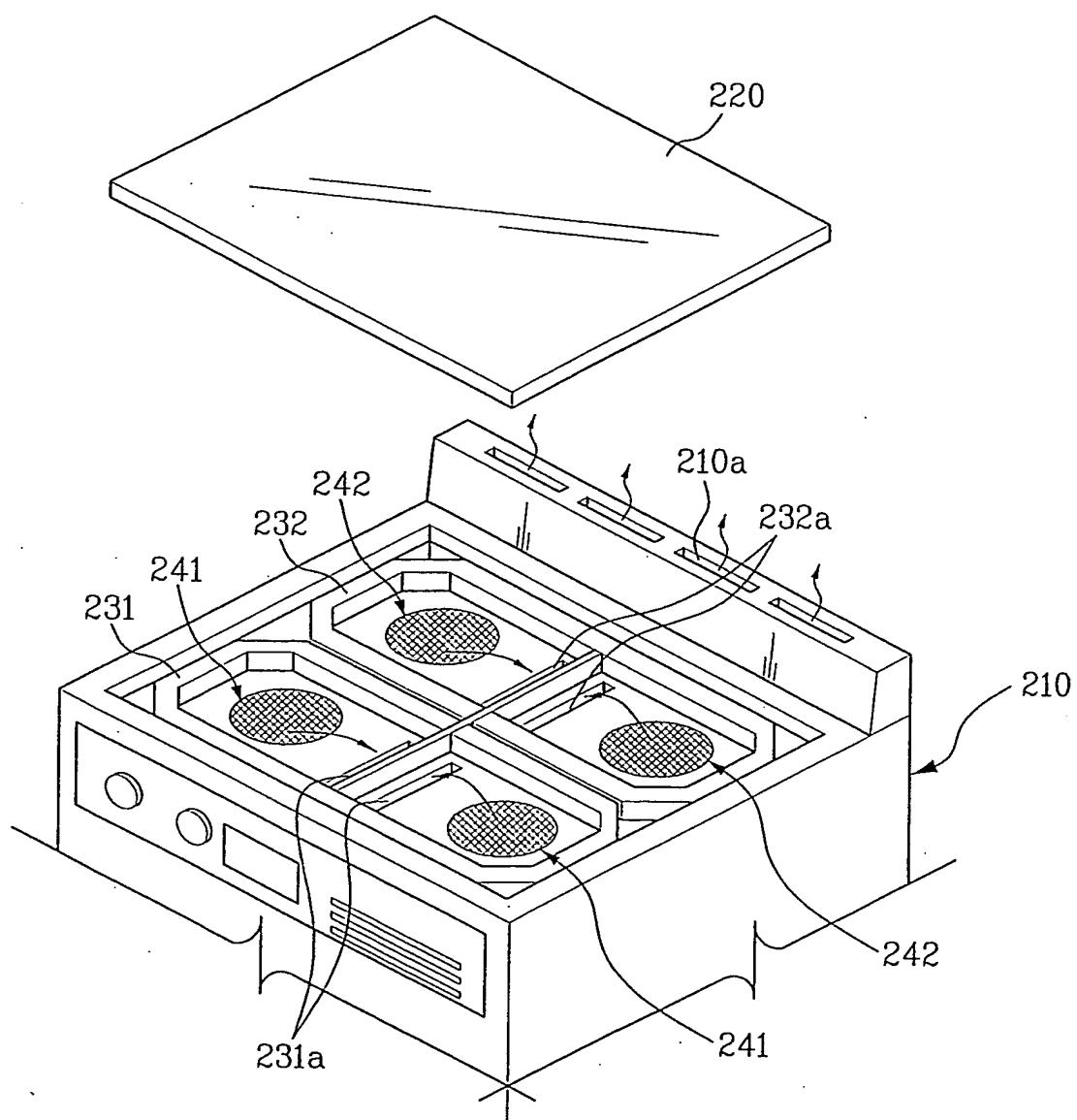
5/13

FIG. 5



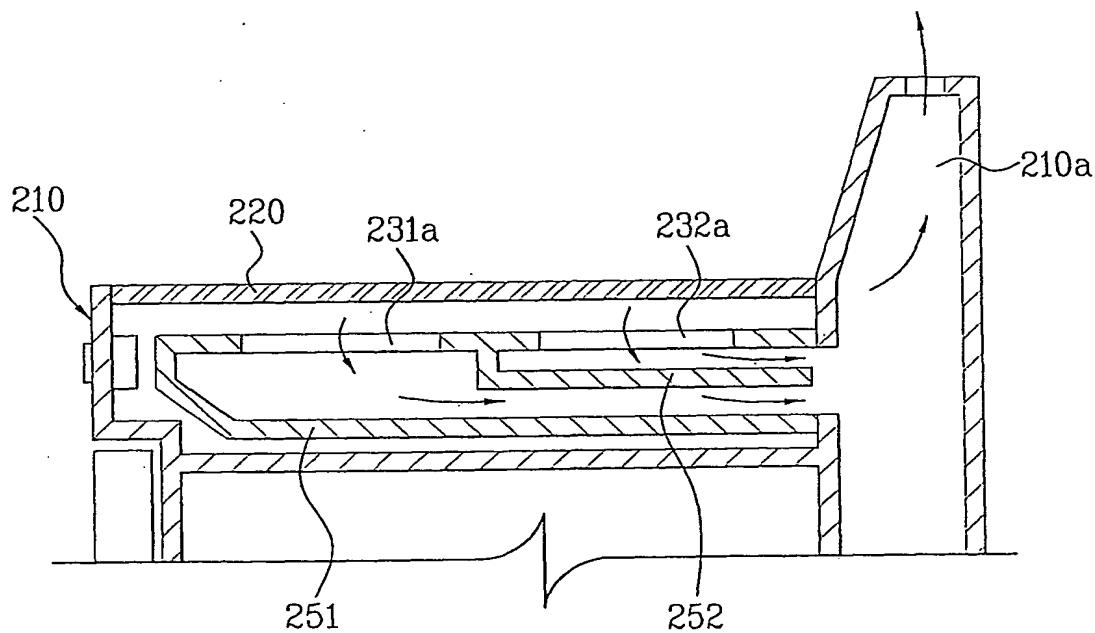
6/13

FIG. 6



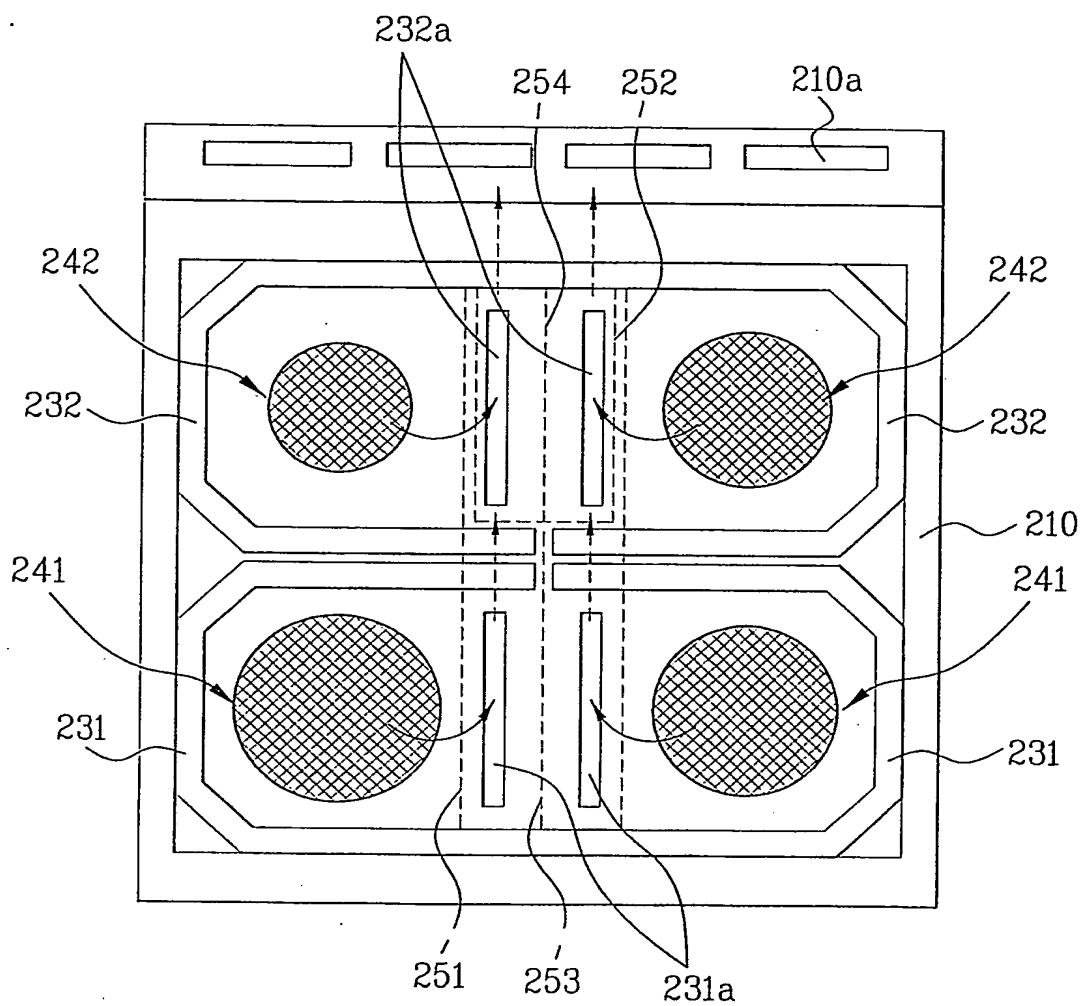
7/13

FIG. 7



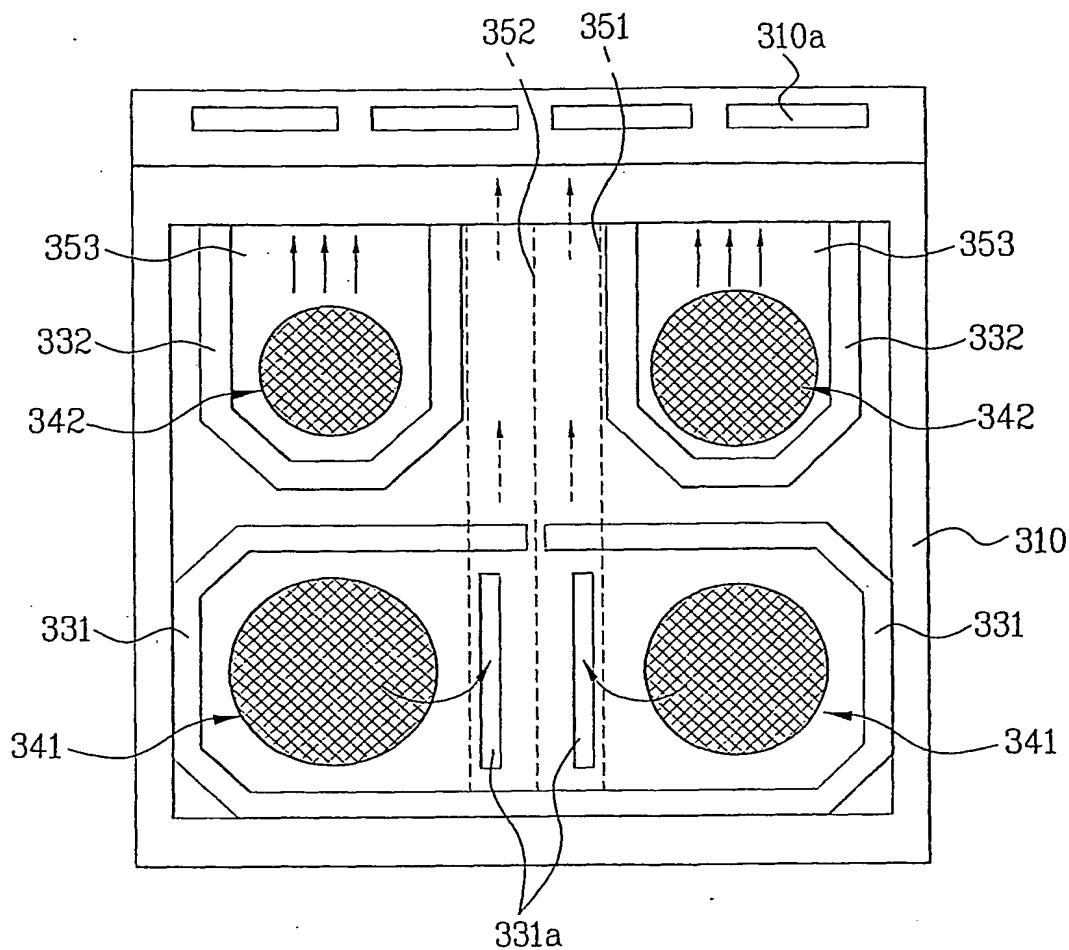
8/13

FIG. 8



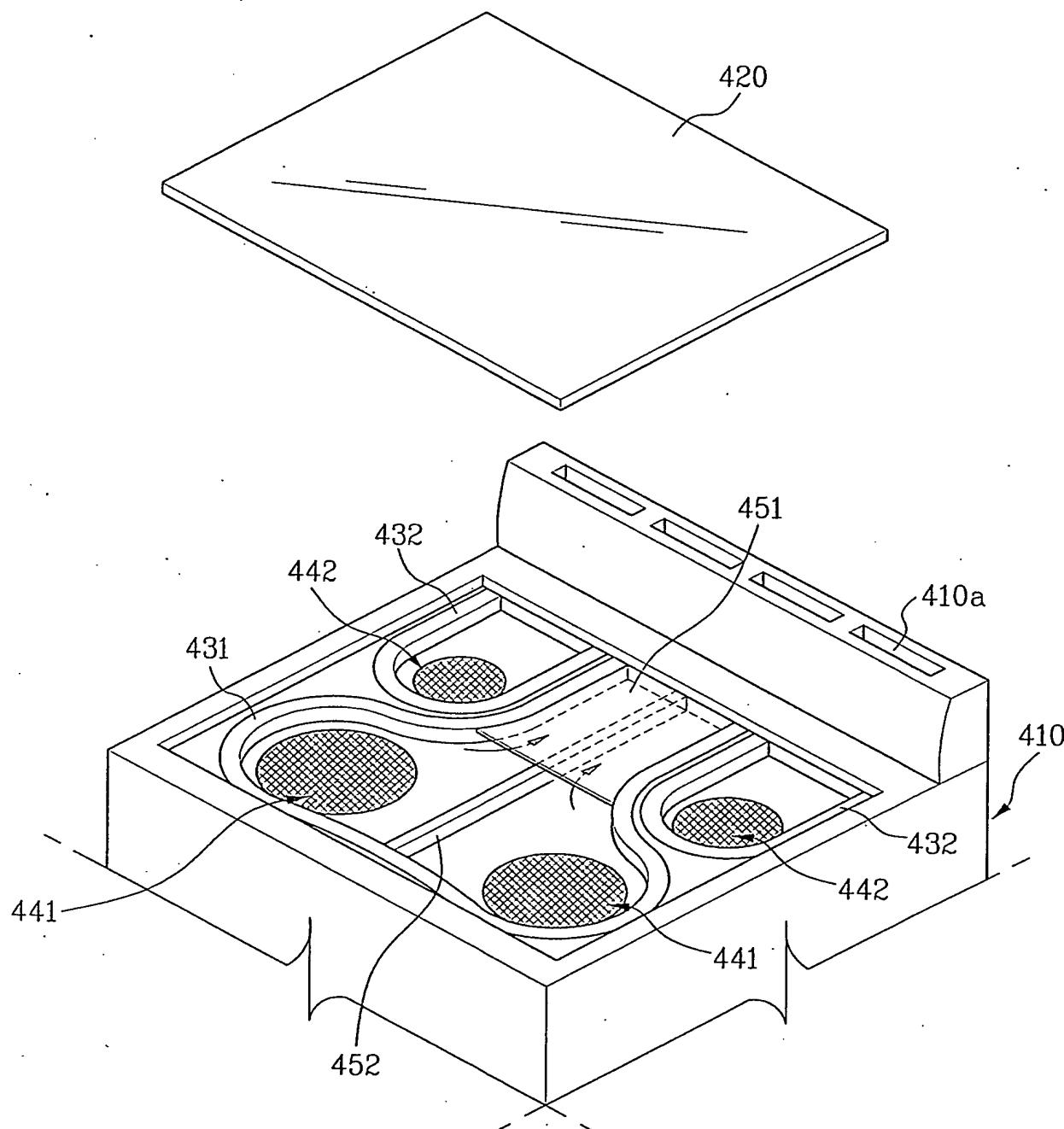
9/13

FIG. 9



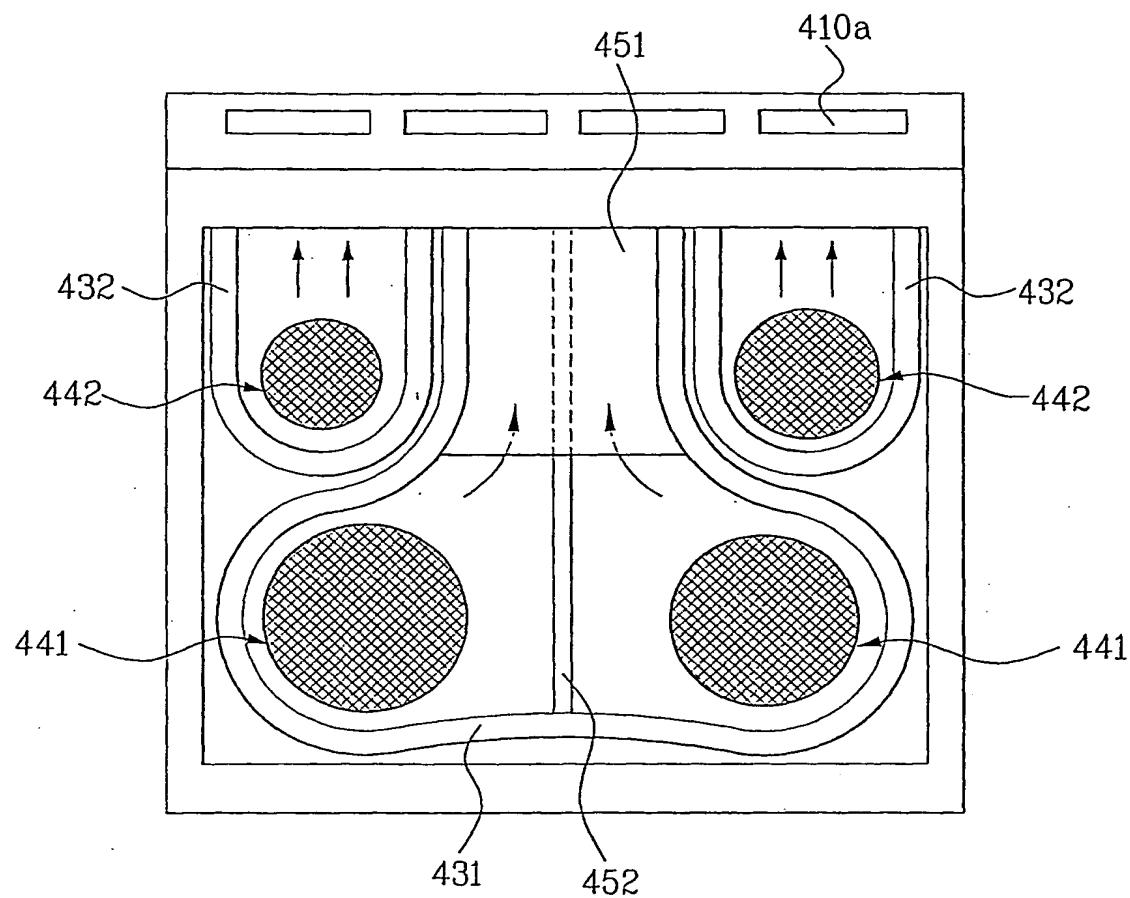
10/13

FIG. 10



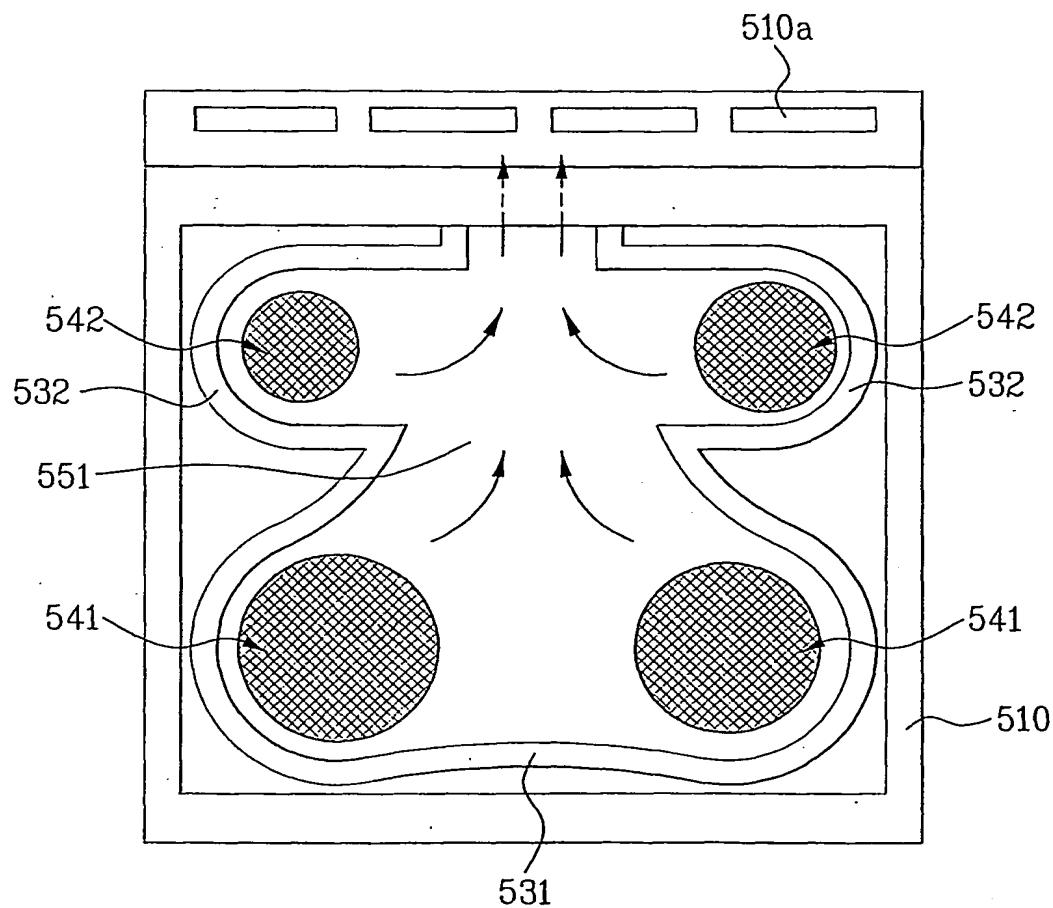
11/13

FIG. 11



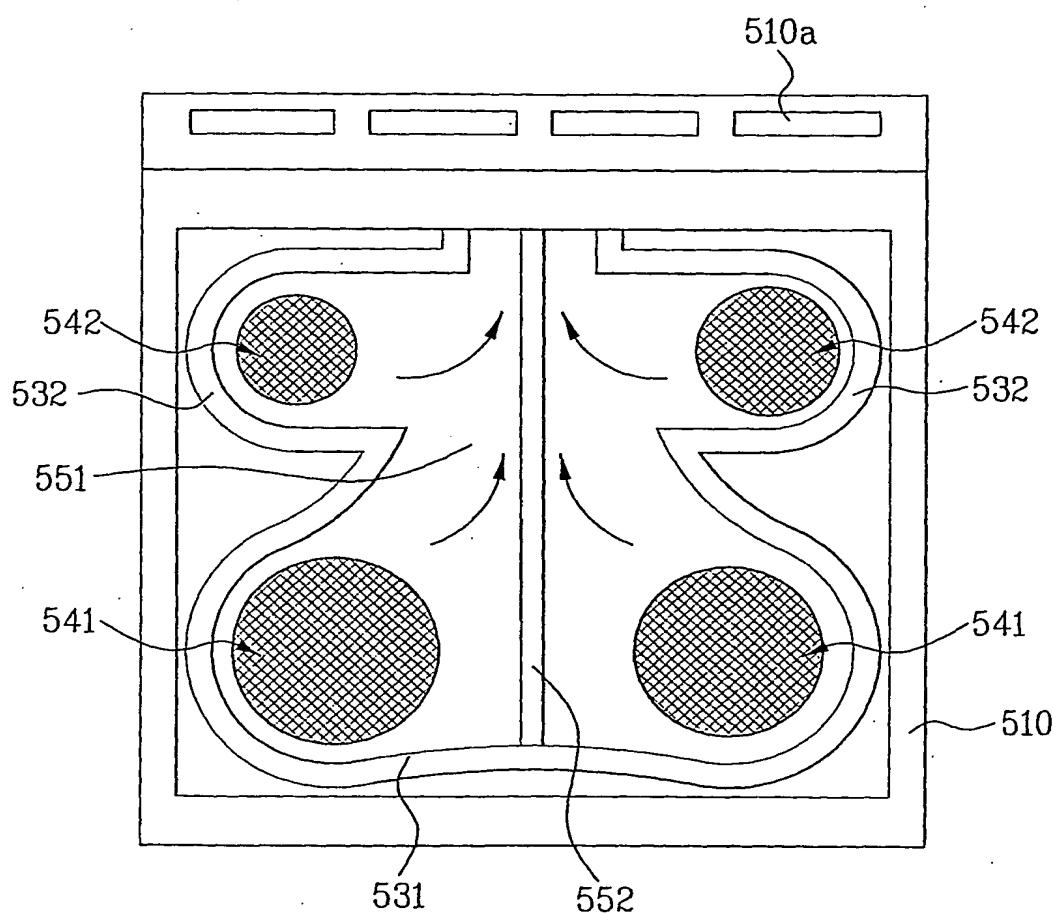
12/13

FIG. 12



13/13

FIG. 13



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 03/02697-0

CLASSIFICATION OF SUBJECT MATTER

IPC⁷: F24C 3/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC⁷: F24C 3/00, 3/02, 3/04, 3/06, 3/08

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0627599 A2(ZANUSSI GRANDI IMPIANTI S.p.A.) 7 December 1994 (07.12.1994) fig. 1,2. -----	1

 Further documents are listed in the continuation of Box C. See patent family annex.

- * Special categories of cited documents:
 - „A“ document defining the general state of the art which is not considered to be of particular relevance
 - „E“ earlier application or patent but published on or after the international filing date
 - „L“ document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
 - „O“ document referring to an oral disclosure, use, exhibition or other means
 - „P“ document published prior to the international filing date but later than the priority date claimed

- „T“ later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- „X“ document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- „Y“ document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- „&“ document member of the same patent family

Date of the actual completion of the international search
26 February 2004 (26.02.2004)

Date of mailing of the international search report

23 March 2004 (23.03.2004)

Name and mailing address of the ISA/AT
Austrian Patent Office
Dresdner Straße 87, A-1200 Vienna
Facsimile No. 1/53424/535

Authorized officer

HOLZWEBER G.

Telephone No. 1/53424/461

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR 03/02697-0

Patent document cited
in search report

Publication
date

Patent family
member(s)

Publication
date

EP A 627599

none